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# APPLICATION FOR PATENT

**TITLE:** **SYSTEM AND METHOD FOR LOCAL META DATA INSERTION**

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## PRIORITY

**[0001]** The present application claims priority to United States provisional application No. 60/193,470, filed March 31, 2000, which is hereby incorporated by reference.

## FIELD OF THE INVENTION

**[0002]** The present invention pertains to interactive and enhanced television systems, and more particularly to incorporating local data content into a regional or national interactive television broadcast.

## BACKGROUND OF THE INVENTION

**[0003]** New standards are making the delivery of internet-based and enhanced content through a television medium a reality. The Advanced Television Enhancement Forum (ATVEF) is a cross-industry group formed to specify a single public standard for delivering interactive and enhanced television experiences. The initial results of the ongoing collaborative effort are set forth in the ATVEF specification v1.1 r26, which is incorporated by reference. The ATVEF specification can also be found at http://www.atvef.com/library/spec1_1a.html. The ATVEF specification enables interactive television content to be authored using a variety of tools and deployed to a variety of television, set-top, and PC-based receivers. As the interactive television industry continues to develop more applications, the ATVEF standard will continue to expand.

**[0004]** The ATVEF specification furthers the convergence of personal computers and traditional television receivers. Predictions indicate that consumers will eventually own a single device that will have the widespread availability and ease-of-use of television, combined with the interactive power and flexibility of a PC. The ATVEF defines the standards used to create enhanced content for delivery over a variety of media, including analog (NTSC) and digital (ATSC) television broadcasts, and a variety of network formats, including wireless, cable, satellite, and the internet.

**[0005]** In addition to defining what enhanced television content looks like, the ATVEF specification also defines how the content is transported from the broadcaster to the receiver, and how the receiver is informed that it has enhancements available for a user to access. The display of enhanced TV content includes two primary steps: delivery of data resources (e.g. HTML pages) and display of named data resources that are synchronized by triggers. Triggers provide a link to the location of enhanced content. Two models of transport labeled "Transport type A" and "Transport type B" define the capability of networks to engage in one-way and/or two-way communication with a user.

**[0006]** Generally, the Transport type A model is for delivery of triggers by a forward path and for the pulling of data by a required return path. Transport type B is for delivery of both the triggers and the data by a forward path while the return path is optional. Specialized enhanced television receivers are generally required to display interactive television programming.

**[0007]** Transport type A is defined for ATVEF receivers that maintain a connection (commonly called a back-channel or return path) to the Internet. Generally, this network connection is provided by a dial-up modem, or can be provided by any type of bi-directional access channel (e.g. cable modem, DSL, T1, ISDN, satellite, etc.). Transport type A is a method for delivering triggers alone, without additional content. Because there is no content delivered with Transport type A, all additional data must be obtained over the back-channel, using the URL(s) passed with the trigger as a pointer to the additional content. For example, using the URL(s) in the trigger, content can be pulled from the Internet via one of the previously mentioned network connections.

**[0008]** Transport type B, on the other hand, provides for the simultaneous delivery of ATVEF triggers and the associated content. In this model, the broadcaster pushes the content to a user's receiver. The receiver then stores the content for later access. Transport type B uses announcements that are sent over the network to associate triggers with content streams. Generally, an announcement describes a content stream and may include information regarding bandwidth, storage requirements, and language (enhancements may be delivered in multiple languages). Since a Transport type B receiver stores any content that will be displayed, the receiver uses announcement information to make content storage decisions. For example, if a content stream requires more storage space than a particular receiver has available, the receiver can elect to discard some older content, or it may elect not to store the newer announced content stream. Receivers can be configured with varying amounts of local storage capabilities.

**[0009]** It should be noted that a single video program can contain both Transport type A data (e.g. broadcast data triggers) and Transport type B data (e.g. IP) simultaneously. This scenario is advantageous to target the widest range of receivers and therefore customers. Thus, both IP-based receivers as well as receivers that can only receive broadcast data triggers will be able to access the same information. Receivers can be configured to support only IP based trigger streams and ignore broadcast data triggers, to support broadcast data triggers in the absence of IP based triggers, or to support broadcast data triggers and IP based triggers simultaneously.

**[0010]** An ATVEF "binding" is the definition of how ATVEF runs on a particular network. The binding may support either or both Transport types A and B. Having one standard ATVEF binding for each network is necessary so that receivers and broadcast tools can be developed independently. The ATVEF binding provides the glue between the network specification and the ATVEF specification in cases where the network specification doesn't contain all the necessary information. Thus, for ATVEF to provide interoperability between broadcast networks and receivers, it is important that each physical network have only one binding. Additionally, it is equally important that each binding provide a fully comprehensive definition of the interface between the broadcast network specification and the ATVEF specification.

**[0011]** ATVEF has defined bindings for delivering data over IP (Internet protocol) multicasts as well as over NTSC (National Television System Committee) systems. Because the transmission of IP is already defined for virtually every type of television

broadcast network, the binding to IP is considered a reference binding. With this reference binding, defining an ATVEF binding for a new network can be based upon a specification of how to run IP over that network.

**[0012]** To illustrate the binding mechanism, consider the binding of ATVEF to the NTSC video format. Here, the NTSC binding defines Transport type A using an NTSC-specific method, wherein ATVEF triggers are broadcast in line 21 of the vertical blanking interval (VBI). Transport type B, on the other hand, uses the IP reference binding for delivering IP datagrams over the other VBI lines.

**[0013]** Television enhancements for Transport type B include three related data sources: announcements (which can be delivered via the session announcement protocol (SAP)), content (which can be delivered via the unidirectional hypertext transfer protocol (UHTTP)), and triggers (which can be delivered via the trigger protocol over user datagram protocol (UDP)). Announcements are used to announce currently available programming to the receiver, can be broadcast on a single well-known multicast address and port, and have a time period for which they are valid. Announcements also indicate the multicast address and port number that the client can listen in on to receive the content and triggers. Details of the announcement and the announcement protocol are provided in section 3.1.1 of the ATVEF specification.

**[0014]** Triggers are real-time events broadcast inside IP multicast packets delivered on the address and port defined in the SDP announcement for the enhanced TV program. In

general, when the client sees a new announcement on the known address and port, the client knows that there will be data available on the given content and trigger addresses. Triggers are also mechanisms used to alert receivers to incoming content enhancements. Among other information, every trigger contains a standard URL that specifies the location of the enhanced content. ATVEF content may be located locally (e.g., delivered over the broadcast network and cached to a disk) or it may reside on the Internet, another public network, or a private network (LAN/WAN). Triggers are described in greater detail in Section 1.1.5 of the ATVEF specification.

**[0015]** While broadcasters can utilize the features of an ATVEF based system to deliver enhanced information and programming to viewers, it is rarely practical to deliver the identical content to all end users. For example, advertising and other promotional material associated with a particular national television broadcast will not be uniformly applicable to all viewing markets and regions. It is thus desirable to modify or substitute certain information into the enhanced television broadcasts at various points in the broadcast distribution and to allow local and/or regional broadcasters to tailor a broadcast to their local market.

## SUMMARY OF THE INVENTION

**[0016]** In one aspect, a device and method for selective data modification is disclosed. In a first embodiment the device comprises an incoming data terminal, a local data terminal, a data distribution terminal, and a data modification unit. The data modification unit is

coupled to the incoming data terminal, local data terminal, and data distribution terminal and is adapted to selectively combine data from the incoming data terminal and the local data terminal in accordance with an instruction set. Preferably, the data modification unit comprises a data stripper, a processor configured to execute the instruction set, and an inserter.

**[0017]** In a further embodiment, the data modification system is adapted to selectively insert local meta data into an incoming data stream, where the incoming data stream has a video data component and a meta data component.

**[0018]** In a still further embodiment, a method of selectively modifying a data signal comprises receiving a data signal, the data signal comprising a first data component and a second data component, separating the first data component from the second data component, determining whether to modify the second data component, retrieving a third data component from a database, merging the third data component with the first data component, and outputting the third data component and the first data component to a distribution terminal.

**[0019]** As will become apparent to those skilled in the art, numerous other embodiments and aspects will become evident hereinafter from the following descriptions and claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0020]** The drawings illustrate both the design and utility of the preferred embodiments of the present invention, wherein:

FIG. 1 is a diagram of a broadcasting network including a meta data substitution system constructed in accordance with the present invention;

FIG. 2 is an embodiment of a meta data substitution system constructed in accordance with the present invention;

FIG. 3 is a broadcast flowchart showing a meta data distribution system constructed in accordance with the present invention; and

FIG. 4 is a flowchart showing a meta data substitution process.

## DETAILED DESCRIPTION

**[0021]** As used herein, the term "meta data" refers to any type of enhanced television content. The term "local meta data" refers to enhanced television content added to a video broadcast at a point other than at the origination of the broadcast. Figure 1 is a diagram of how a meta data substitution system 100 constructed in accordance with the present invention operates to insert local meta data content into a nationally broadcast television program. A national broadcaster 50 transmits its program signal 110 to a satellite 55. The signal 110 is then relayed by the satellite 55 to a local station or network affiliate 60. In addition to a video component, the signal 110 as transmitted by the national broadcaster 50 and received by the local affiliate 60 contains a generic meta data

component that the network has associated with the video data component. A local meta data center 140 stores local meta data 142 that can be selectively associated with the national signal 110. The meta data substitution system 100 resides in proximity to the local station 60 and monitors the meta data content of the national signal 110. The meta data substitution system 100 determines whether to insert local meta data 142 into the national signal 110 before it is sent to a viewer 70. If meta data substitution occurs, a modified signal 110' is sent to the viewer 70 and includes the local meta data 142 particular to the viewer's city, state, or region.

**[0022]** Figure 2 shows the meta data substitution system 100 in more detail. The meta data substitution system 100 is generally operative to monitor the meta data content that is received in conjunction with an incoming broadcast signal 110. The broadcast signal 110 is an incoming signal in the form of an internet, cable, satellite, or terrestrial broadcast. Other forms of broadcast media are also contemplated. The broadcast signal 110 includes two components: a video data component 112 and a meta data component 114. The meta data substitution system 100 determines whether the meta data component 114 should be replaced with a local version of the meta data (local meta data). In a typical distribution scenario, the original meta data component 114 associated with the broadcast signal 110 is replaced with customized local meta data 142 that is specifically tailored to the market where the broadcast is being received and distributed to viewers. The local meta data 142 is stored at the local meta data center 140. The local meta data center 140 can be an on-site or off-site data storage unit such as a local or wide

area network, a hard disk, or any number of other known types of data storage facilities or devices.

**[0023]** The meta data component 114 may be generic informational material that pertains to a national advertising campaign (e.g. an automobile ad), or any other type of informational material commonly associated with broadcasting. The meta data component 114 is directly associated with the video data component 112 of the broadcast signal 110. This type of globally distributed national advertising campaign typically does not contain information that is tailored to any particular metropolitan area or geographic region. Accordingly, the meta data substitution system 100 can be used to replace all or part of the national automobile ad with advertising that is targeted to the particular metropolitan area. Information that may be included at the local level includes local pricing and dealer locations.

**[0024]** Meta data substitution system 100 can be situated at any point downstream of the original point of video distribution (e.g. the national broadcaster 50 in Fig. 1). For example, meta data substitution system 100 can be situated at distribution points such as a regional television network, a local television network affiliate, a local cable head end, or an internet service provider. As can be further appreciated, meta data substitution system 100 can be situated at multiple distribution points, thereby creating a cascading data substitution effect. Fig. 3 depicts such a scenario. National broadcaster 50 initiates the broadcast signal 110. Thereafter, regional broadcaster 58 has the opportunity to modify or substitute data into the broadcast via meta data substitution unit 100 prior to

distributing the broadcast signal to the regional viewing audience 59. Either a modified signal 110' or the original signal 110 can be broadcast to the regional viewing audience 59. Likewise, the regional broadcaster 58 can forward the original signal 110 to a local broadcaster 60 or another type of downstream broadcaster. Further down the distribution chain, local broadcaster 60 has its own opportunity to modify or substitute data into the broadcast via meta data substitution unit 100a before a locally modified signal 110'' is passed to a local viewing audience 61. The local broadcaster 60 also has the discretion to broadcast the original signal 110. In this scenario, the enhanced content is increasingly tailored to the intended viewing audience.

**[0025]** Referring again to Figure 2, meta data substitution system 100 includes a stripper 132, a processor 134, an inserter 136, and a local meta data center 140. Collectively the stripper 132, the processor 134, and the inserter 136 represent a generic meta data substitution component 130. Preferably, each of the stripper 132, processor 134, and the inserter 136 have appropriate data terminals to facilitate the transfer of data into and out of the meta data substitution system 100.

**[0026]** A first embodiment of the operation of the meta data substitution system 100 is illustrated by the flowchart of FIG. 4 and will be described in conjunction with the diagram of FIG. 2. Beginning at 202 the broadcast signal 110, including both the video data component 112 and the meta data component 114, is received by the meta data substitution system 100. The video data component 112 and the corresponding meta data component 114 can be received in a variety of formats depending upon the particular type

of network. In one example, the video data component 112 is delivered in NTSC format with the meta data component 114 (i.e., announcements, packages, and triggers) mapped to various lines of the vertical blanking interval.

**[0027]** After receipt of the video broadcast signal 110, the stripper 132, at 204, separates out the meta data component 114 from the video broadcast signal 110 resulting in extracted meta data 133 and remaining video data 135. This process is dependent upon the format of the received video broadcast signal 110 and the stripper 132 is preferably formatted to recognize and process a variety of known data formats. The extracted meta data 133 is then forwarded to the processor 134 and the remaining video data 135 is forwarded to the inserter 136.

**[0028]** The processor 134 is generally operative, at 206, to determine whether substitution of the extracted meta data 133 should occur. This determination is based upon variables defined by the originator of the meta data component 114. Such a determination can be based upon the nature of the meta data as defined by the specification of the announcements and triggers in relation to the type of substitution data being offered.

**[0029]** In one embodiment, the substitution determination can be based upon the specification of new "tve" options to the "A" parameter for a Transport B announcement. These and other variables and parameters are found in the ATVEF specification which

was previously incorporated by reference. These new "tve" options are shown by the following examples:

1. A=tve-localInsertLevel:x
2. A=tve-region:regionName
3. A=tve-id:x

**[0030]** In the first example, "x" is a priority level, "1" being the highest (can't overwrite) and "99" being the lowest (overwrite all the time). In this example, the processor 134 will compare the priority level in the extracted announcement to its own assigned priority value. If the priority level in the extracted announcement is lower than its own priority level, then substitution of the announcement is permissible. Conversely, if the priority level in the extracted announcement is higher, then substitution will not be allowed.

**[0031]** In the second example, the substitution determination is based upon the geographical region where the processor 134 operates. If the processor 134 is operating in the region named in the extracted announcement, then substitution is permissible. The converse is true if the processor is not operating in the extracted announcement.

**[0032]** In the third example, "x" is a unique ID. The value of the unique ID determines which processors 134 are permitted to substitute for the extracted announcement. In one embodiment, this determination process is based on a table lookup that defines the set of IDs that are permitted to perform the substitution.

**[0033]** In alternative embodiments, the substitution determination can be based upon the specification of new attribute options to the Transport type A or Transport type B triggers. These new attribute options can include the following definitions: localInsertLevel:int, region:string, and tveID:string. Each of these new attribute options will dictate a similar substitution determination process as discussed above. These attributes are further defined in the ATVEF specification which was previously incorporated by reference. These examples are not intended to be exhaustive and additional options can be defined to address specific distribution scenarios that require localized customization of embedded meta data.

**[0034]** If the processor 134 determines, at 206, that substitution is permissible, then the local meta data 142 is retrieved, at 208, from the local meta data center 140. The local meta data 142 is then forwarded, at 210, to inserter 136. The inserter 136 generates the final video data stream 110' that is to be output to a localized distribution channel 120. At 214, the inserter 136 inserts the substitute meta data 142 received from the processor 134 into the remaining video data 135. The insertion process is dependent upon the particular format of the video data and the inserter 136 is preferably formatted to accommodate a variety of known video formats.

**[0035]** Alternatively, if the processor 134 determines, at 206, that meta data substitution is not permissible, then the originally extracted meta data component 114 is forwarded, at 212, to the inserter 136. At 214, the inserter 136 then inserts the originally extracted meta data 133 back into the video data 135. Alternately, it is possible for the originally

extracted meta data to still exist as part of the originally received video broadcast signal 110. In this scenario, the originally extracted meta data 133 need not be reinserted into the video data stream when the meta data has remained unchanged (i.e., no meta data substitution). Thus, in that case, the inserter 136 is operative to simply forward the entire video broadcast signal 110 that was originally received by the stripper 132.

**[0036]** After the substitute meta data 142 has been inserted, the inserter 136 outputs the repackaged video data stream 110' to the localized distribution channel 120 at 216. With data substitution, customized local content replaces the non-targeted generic content sent by the national broadcaster.

**[0037]** Although the present invention has been described and illustrated in the above description and drawings, it is understood that this description is by example only and that numerous changes and modifications can be made by those skilled in the art without departing from the true spirit and scope of the invention. The invention, therefore, is not to be restricted, except by the following claims and their equivalents.